interesting style. It is a valuable feature that Mr. Barkley's sojourn in Turkey was not made during recent events, and his narrative is not written with a view to advocate one side or the other in the present unhappy conflict. He saw the Bulgarians in what may be called their normal condition, and had no reason to be prejudiced for or against any section of them. He saw much to condemn and a good deal to praise both in Christians and Mohammedans, but little that was praiseworthy in Turkish officials, "from the Governor-General to the hangman." The work contains much information on the Bulgarians, their characters and ways, and will be found both interesting and instructive.

The District of Bákarganj; its History and Statistics. By H. Beveridge, B.C.S. (London: Trübner and Co., 1876.)

THE publication of this work is somewhat opportune, for under the reformed, if not improved, spelling of the title, our readers will no doubt recognise the district of Backergunge, which, with other districts at the mouth of the Hooghly, was recently overwhelmed by one of the most disastrous cyclone-waves on record. Mr. Beveridge is magistrate and collector of the district, and as such has had a good opportunity of becoming acquainted with it. He has evidently also read a great deal on the subject, and the result is a work which ought to take a good place as a local history. Mr. Beveridge describes the physical features of the district, its antiquities and early history, the pergunnahs and sunderbunds, treats of Government estates, land tenures, the inhabitants, productions, and manufactures. The second part refers to the several departments of the administration, education, &c. This district, from its low-lying position at the top of the Bay of Bengal, has been peculiarly subject to the inrush of the wave which accompanies cyclones. Until the recent catastrophe the great event in the history of the district was an inundation, evidently caused by a cyclone-wave, which occurred in June, 1822. According to contemporary account, 100,000 persons lost their lives, and as many cattle; but this must pale before the recent catastrophe, and henceforth October 31, 1876, will be the black-letter day in Bákarganj. Mr. Beveridge's book will be found to contain a great deal of really valuable information, and if every district in India were treated in a similar manner, we should possess a library of information of the greatest value. The volume contains a good map of the district.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

Sea Fisheries

PROF. NEWTON has sent you a long reply to my criticism of his Address to the British Association; and although it is exceedingly inconvenient to me, as I believe it is also to him, to continue the discussion at the present time, I must ask you for space, as soon as you can spare it, to point out as briefly as I can, how little progress my friend has yet made in his subject. He was good enough to show me his reply before he sent it to you, and I then told him I should have to meet him on every point in it. Nevertheless he sent it for publication, and as the subject appears to me to be one on which the public should not be misled, I am compelled to ask space for some comments upon it.

The Minutes of Evidence given before the Commission, consisting of 61,831 questons and answers rather frighten him, and he turns to the Index for help. Without a careful study of the evidence the Index is practically useless for my friend's purpose, as I told him. And some knowledge of the habits of sea-fish will be exceedingly valuable in enabling it to be understood. The Index is not a *précis*. There is intrinsic evidence in Prof. Newton's reply that he framed it, I think I may say solely from the Index, and not from the evidence; his tables of increase and decrease, and calculations of the number of questions and answers relating to each, are obviously so, and the value of his arguments may be judged of accordingly. To show what his tables are worth I will take two or three entries in them for examination. "Bream" is the first, and that fish is said to have increased. This is the only entry relating to bream in the whole Index. Bream are common fish on very many parts of our coast; they often congregate in large numbers, sometimes on one part, sometimes on another; they happened to have been unusually numerous off Hastings just before the Commissioners were there, and the fishermen accordingly recorded the increase. But there is not the slightest reason for believing bream were then more abundant than usual on our coasts generally than the reverse. "Brill" has two entries, both in the decrease column. In one case the evidence is that of fishermen in Start Bay, who used the sean nets within half a mile of the beach, and who were furious against the Brixham trawlers for sometimes working in the Bay; the said trawlers, up to that time, and for the twelve years since, finding no falling off in the supply of brill. The other case was at Liverpool, where brill was mentioned, among other fish, by the Inspector of the Fish Market, as having diminished. He made the remarkable statement that not 1 per cent. of sea-fish of all kinds was brought to the market in 1864 compared with what had been taken there twenty years before. As the number of fishing-boats had increased during that interval, and the price of fish was, if anything, rather less, owing to the large supplies sent by railway from the east coast direct to the fishmongers' shops, and not going into the market, it is very clear that if the fishermen were getting a living from the 1 per cent. in 1864, they must have been making at least 100 times as much money twenty years before, which is an absurdity. "Cod and ling" come next. Here my friend had better look to his arithmetic. There is no doubt that cod, and haddock especially had fallen off at many of the inshore fishing grounds. They are both species which have fluctuated very much in numbers in many places, the haddock in particular making its appearance in abundance for a season or two, and then becoming very scarce; or they have left places where they were abundant for years together, and again unexpectedly returned. The last report I had from the north-east coast of England, just three years ago, was that the line fishermen were doing well, and their only complaint was of the scarcity of mussels for bait. But it was along this coast that the great outcry against the trawlers arose in 1863, which led to the issue of the Sea Fisheries Commission; and a great deal of the evidence given there was such as might have been expected under the circumstances.

It will be difficult to treat the next entry seriously, but I will try to do so. In a table professing to show the increase or decrease of the fishes with which our markets are supplied, he notes one particular kind as having decreased, and he counts the two instances as helping to prove that our sea fisheries are on the high road to ruin. Those persons who have even but a very slight acquaintance with sea fishing will be rather surprised to hear that the fish whose end is approaching is nothing less than the "dogfish!" one whose utter extermination would gladden the hearts of the fishermen from the Shetlands to the Land's End, and from Dingle to Dover. Hordes of these predatory and mischievous fishes roam round the coasts of the British Islands; sometimes they swarm in one place, sometimes in another. In the herring season the destruction they have caused to both fish and nets has been such that the fishing where they were has been almost entirely stopped for nights together, and the long-liners also suffer severely from them. They are said to have seriously interrupted the Yarmouth herring fishery this year; and the official report for 1875 from the coastguard at Killibegs, in Ireland, states that the dogfish had so much increased that Donegal Bay had, on several occasions, been apparently cleared of fish by them, and that the nets were constantly full of them. It may be well said that happy is the country whose dogfish are decreasing! Would that I could believe they were becoming scarce in our own!

Prof. Newton has evidently been taken in by a heading in the Index, thus—"Dogfish, consumption of." The explanation is as amusing as it is simple. In Morecambe Bay some of the fishermen catch the dogfish, and after skinning it and removing the head and tail, send it under the name of "Darwen Salmon" to the Blackburn and Preston weavers, who are the only persons who will buy it. This is the only case I ever heard of in which the hated dogfish was not knocked on the head and thrown overboard whenever there was a chance of doing so.

Had I space at command I could enlarge on these tables, but

I think I have said enough to show how much dependence can be placed on them.

We now come to the "process of extinction of animals." Here my ingenious friend should be on safe ground. His argument is, as I understand it, that a species first becomes scarce on the borders of the locality or area where it is found in most abundance. Let me apply this rule to the herring. That fish is only met with when it shows tolerably near the coast—on what I presume he would call the "borders." Can he tell us where the herrings go after what is called the herring season, when they disappear—where the great herring centre is? Fishermen have a vague way of answering this question by saying that they go into deep water, which strictly means somewhere out of sight. Has Prof. Newton evolved more than that from his inner consciousness in his study at Cambridge? That he had given five minutes' attention to the practical study of the habits of the herring—to its life-history, before he gave his Address to the British Association at Glasgow, I venture to doubt very much. The apparent abundance of any fish depends very much on the success of the fishery for it; but many things may and do interfere with that success. It is only within the last very few years that evidence, apparently of great importance, has been obtained, pointing to a relation of the temperature of the sea to the depth at which the herrings swim, and consequently to the chances of their coming within reach of the floating drift-nets, or otherwise. No one can say, with any confidence, why fish are taken abundantly by drift-net or line in one week, or even day, and very few in the next. It may appear very well for Prof. Newton to talk of the consideration of our sea-fisheries being "fraught with unusual difficulties," but he disposes of the question as if it were one of no difficulty, by saying, in his Address, that "it is highly necessary to impose some limitation upon them"—the sea-fisheries. This implies, as plainly as can be, that, notwithstanding the "unusual difficulties," he has quite made up his mind on the subject.

Again, he says, "I have found that the grumblers among the fishermen commonly assign some specific cause for their complaints, be that cause real or imaginary. Their assignment of any cause is purely a matter of opinion with them." Is not Prof. Newton aware that very many of the fishermen who gave evidence before the Commissioners stated these matters of opinion simply as matters of fact? The history of the trawling question is quite sufficient to prove this. He then says, "Their statements [those of the fishermen] as to the increase or decrease of fishes relate to a matter of fact within their knowledge." Does he know the meaning of "conflicting evidence," for which he gives a separate column in his tables? If one fisherman says fishes are increasing in a district and another says they are decreasing, are they both to be considered as speaking of a matter of *fact* within their knowledge?

In the matter of the extent of the inquiry under the Sea Fisheries Commission, I must keep my friend to the point. My stated objection to Prof. Newton's address was that in it he clearly spoke of a decline as a fact, and of the Sea Fisheries Commissioners being unable to find any remedy for it—"There was nothing to be done with our Sea Fisheries but to leave things alone." No possible refuge under the expressions in his Address will prevent this meaning being obvious.

I now come to this statement:—"It is quite compatible with an increased *supply* of fish that there may be an actual decrease in the *stock* of fishes." It may be so; but as, at all events, in the important drift-net and line-fisheries, the capture of the fish depends entirely on their chancing to come in the way of the nets or baits, and there is no hunting them down as there is with game on land, the probability of such a case does not appear to be very great. Of course, Prof. Newton will admit that the converse proposition is equally sound—that a decreased supply of fish may be compatible with an increased stock in the sea. There may be millions of herrings in the British seas without our fishermen finding them out; in fact, there must be, for it is only during a certain season in each year that the fishermen meet with them, and, as they will themselves admit, "luck" has then a great deal to do with it.

The "practical mischief likely to result" from such agitation as his Address might stir up is this—the fishermen may fear some new regulation for the size of mesh they use in particular fisheries, and be afraid to order new nets of the old pattern when they are urgently wanted, as was the case in 1863; for a mile and a quarter of herring nets, or two miles and a half of mackerel nets, are very much more costly articles than the comparatively small nets used for salmon-fishing in the rivers. The salmon fishers, as it is, are sufficiently bothered with inquiries and alterations of bye-laws.

Prof. Newton can find no new facts in my book on "Deep-Sea Fishing," supporting my belief that our sea fisheries are not falling off; but I may mention that I have shown from official returns that since the Commissioners reported, there has been a vast increase in the number of the most important class of fishing-boats, used respectively for the trawl, drift, and line-fisheries; and I believe most people will consider that when, for years in succession, more money is invested by the fishermen generally in boats and gear—by the persons who Prof. Newton says know more about fishing matters than he does—and the general supply to the markets does not fall off, but the contrary, there is not much evidence of the stock of fishes in the sea becoming exhausted. That the fisheries at particular places have fluctuated is well known, and if we knew more about what affects the movements of fish, this might perhaps be explained.

The reason why the fishermen were so much in favour of the Sea Birds' Preservation Act was simply because the congregation of sea birds over the shoals of fish often told the fishermen when their fishing was likely to be successful. Prof. Newton, I believe, was anxious to prevent certain species of sea-bird having the protection of the Act, but, unless I am greatly mistaken, he was strongly in favour of the general principle of the Bill. What particular species of fish is devoured by any particular species of protected sea-bird does not affect my argument; but I may suggest that the protected gulls are surface-feeders, and mackerel, herrings, pilchards, and sprats, besides plenty of young fishes of other species, are commonly considered as surface-swimmers. The collection of gulls over the shoals of fish is spoken of by the fishermen on many parts of our coast as one of the "appearances of fish."

The last point to be considered is Prof. Baird's Report on the American Sea Fisheries. Prof. Newton says the decrease of these fisheries on the Atlantic coast of America is therein treated as a fact beyond denial. He is quite correct here; but he adds that "'overfishing' is unquestionably assigned as the chief cause of that decrease."

I have Prof. Baird's Report for 1872 and 1873 now before me. I must content myself with a few extracts from it. Among other fishes he mentions, Prof. Baird gives a good notice of the alewife or fresh-water herring, and speaks of how valuable it has been in attracting the deep-sea fishes to the shores; he points out how the alewife has diminished, owing to the dams in the rivers preventing the alewives proceeding up to their spawning grounds some way from the sea, this fish having much the same habits as the salmon and the shad. As a consequence the myriads of young fish which used formerly to come down to the sea are now not to be met with at the mouths of the rivers. He goes on to say, at page 12:—"It would, therefore, appear that while the river fisheries have been depreciated or destroyed by means of dams or exhaustive fishing, the codfish have disappeared in equal ratio. *This is not, however, for the same reason, as they are taken only by the line, at a rate more than compensated by the natural fecundity of the fish.*" (The italics are mine.) At p. 60 Prof. Baird says, after speaking of the value of the alewife as food for salmon, trout, and other freshwater fishes: "It is in another still more important connection that we should consider the alewife. It is well known that within the last thirty or forty years the fisheries of cod, haddock, and hake along our coast have measurably diminished, and in some places ceased entirely. . . . Various causes have been assigned for this condition of things, and among others, the alleged diminution of the sea-herring. After a careful consideration of the subject, however, I am strongly inclined to believe that it is due to the diminution, and in many instances to the extermination of the alewives" (or freshwater herring). . . . . "We know that the alewife is particularly attractive as a bait, especially for cod and mackerel. . . . The coincidence, at least, in the erection of the dams and the enormous diminution in the number of alewives, and the decadence of the in-shore cod-fishery, is certainly very remarkable. It is probable, also, that the mackerel fisheries have suffered in the same way, as these fish find in the young menhaden and alewives an attractive bait."

Unless Prof. Baird has in a later report expressed an entire change of opinion, I think I am justified in believing that Prof. Newton is as unable to comprehend the question of the American sea-fisheries as he is that of our own.

My friend has told me in his usual good-humoured manner that neither of us will ever convince the other, and I am certainly indisposed to throw away any more time on this discussion; but I may remind those who are interested in it that the question really lies between Prof. Newton and the Royal Commissioners. On the one hand, Prof. Newton, with no practical acquaintance with the subject, knowing nothing of the witnesses or of the circumstances under which they gave their evidence, but taking the Index to the evidence as his sole guide, so completely satisfied himself that the Commissioners had arrived at an erroneous conclusion in believing our sea-fisheries were flourishing that he brought their delinquencies before the British Association. On the other hand, Prof. Huxley (who somehow has obtained the character of thoroughly working out any subject he takes up, so far as he has the means of doing so) and the other Commissioners themselves visited the several fishery stations, ascertained beforehand the nature of the disputes and complaints among the fishermen, and examined and cross-examined the various witnesses. They spent many days separately and together in considering the evidence on the several subjects of their report, and unanimously agreed to this among other conclusions:—

"The total supply of fish obtained upon the coasts of the United Kingdom has not diminished of late years, but has increased; and it admits of further augmentation to an extent the limits of which are not indicated by any evidence we have been able to obtain." E. W. H. HOLDSWORTH

Athenæum Club, November 25

Examinations in Science

MAY I beg you will introduce to the notice of your readers a grievance urgently in need of a remedy? The grievance is considerable; the remedy simple; and if scientific men will not make it their concern, nobody else will.

A short time ago, when the competitive examination controversy waxed warm, I ventured to enter somewhat fully into the present haphazard system of awarding marks to candidates who competed for posts in the public service. My object then was twofold:—(*a*) to bring facts and figures to bear against the erroneous statements of a few theorists who unfortunately were able to command a great deal of public attention; (*b*) to get fair play for all examinees. My object now, however, is to warn those who advocate the advancement of scientific instruction, that the present faulty method of conducting public examinations (in some quarters at least) tends far more to the depression than to the encouragement of scientific study. Destitute myself of scientific knowledge, and bound to no particular curriculum of instruction, I am obviously not writing from the point of view of a partisan; and if I have joined in the lament of scientific men that insufficient consideration is given in most schools to the teaching of science, it is simply because there are good grounds for the conviction that the higher education of this country is too one-sided.

The point I wish to raise is not whether the grammar and philosophy of science contribute to the training and stimulating of the youthful mind in a greater or less proportion than the grammar and ornaments of the Latin and Greek languages; nor whether so-called technical instruction is being properly administered or injudiciously shelved; but I am asking whether scientific teaching, so however little it be, is adequately encouraged by scientific men in the persons of their public examiners?

Judging from the issues of certain examinations, the candidates for which are drawn from the leading schools, I am satisfied that it is not.

By dint only of considerable pressure are candidates induced nowadays to carry on their school course in science for an additional year or two, so general is the conviction among them that they are merely gambling for marks and that the object of much honest labour will not be attained. In fact, for the particular purposes they have in view, they run the double risk of wasting their time and burning their fingers.

It may, of course, be urged that the ends of science are not furthered by youths who aspire to touch only a modest limit in view of qualifying for public employment; but surely as much may be said of almost every other branch of study. And if this is really the opinion entertained by science examiners, it would be better at once to expunge all scientific subjects from the Government programmes.

But candidates and teachers are concerned only with the rules and regulations that are actually current, and that wiser men have made; and their grievance is that there *is a greater element of uncertainty in the awards issued for science than for any other subject.* Instead of estimating the various science subjects as fractional parts of a wide and comprehensive programme, and of dispensing marks on a fixed and definite plan whereby a given quota of proficiency shall be made to carry the same *relative* weight as a given quota of proficiency in other branches, it would seem that examiners, who, by the way, are constantly being changed, regard their own branch as a distinct entity—set up their own standard of excellence for the nonce—and distribute basket after basket of ducks' eggs among all who fail to reach a very advanced qualifying minimum, forgetting perhaps that meanwhile the classical candidate is receiving his modest or substantial reward according to the character of his work. The position indeed would be pretty much the same as if a classical examiner should announce that no candidate would be entitled to a single mark who did not write a faultless copy of Greek verses! I am prepared to show that this ideal standard has varied to the extent of 50 per cent. in two successive years; nay, more, that science candidates have suffered a loss of 50 per cent. in their marks after an additional year's reading under the best teaching that money can purchase. A case occurred some months ago of a youth who, having won the Huxley and Balfour prizes in Edinburgh, entered his name for an open competitive examination in London. He obtained 64 out of 1,000 marks in his two branches of science, at a moment when from 500 to 600 marks out of a total of 1,500 were being showered upon the classical men. At this particular ordeal "Chemistry" chanced to receive decent recognition, but as this youth's tastes happened to run in another direction he was ignominiously defeated.

Any number of such cases may be enumerated, but perhaps I have said enough to prove that a real grievance does exist.

The remedy is obvious: either to induce the authorities to strike out the words "Natural Science" from their list of subjects, or to arrange for the formation of a committee of science examiners who will devise some plan for fixing, as nearly as possible, a uniform standard, and for distributing marks on equitable principles, after consultation with the classical, mathematical, and other examiners. In default of this I do not hesitate to say that examinees will continue to be trifled with at the most important crisis of their lives; for at these public examinations it is no longer a question whether they gain a scholarship or improve their position at school—it is a question of their future career.

I have yet to state the main point. Setting aside the fact of hardship and injustice, it may be asked how far the present independent and very summary system of dealing with batches of schoolboys can possibly cripple the cause of the technicists who are anxious to press forward the teaching of science. My reply is that science candidates, heartsick with disappointment, will fall out of the ranks and will induce others not to enter them; the belief will rapidly gain ground in the schools that science is "a mistake;" and there is abundant reason for supposing that many a schoolmaster will be only too willing to endorse this opinion. I contend that our public examiners wield the thong that lashes the schools into action, and that we are only just beginning to get fair play for what are called "modern" subjects, but that unless our science examiners apportion their marks in a more just and consistent manner they will simply drive all science candidates "bag and baggage" out of the field. In other words, they will virtually be paying a premium to the schoolmasters for neglecting to carry out the very objects they are clamouring for.

W. BAPTISTE SCOONES

Garrick Chambers, Garrick Street,
December 12

The Rocks of Charnwood Forest

MAY I be allowed a short space in reply to Prof. Hull's courteous reference to my letter on the Charnwood rocks, for I fear that I have failed to make two points in that sufficiently clear? One was, that as the Borrowdale series of the Lake District and the (Lower) Cambrian series of North Wales are *equally* azoic, no correspondence in time with the latter could be inferred for the azoic Charnwood rocks. The argument from absence of fossils surely tells as much one way as the other; indeed, having regard to the similar petrological conditions of the Borrowdale and Charnwood rocks, I think it is slightly in favour of their correspondence. The other point was, that as Prof. Sedgwick's term Cambrian included the Cambrian and Lower Silurian of the survey, his authority could not be quoted in favour of the (Lower) Cambrian age of the Charnwood rocks any more than of their correspondence with the Borrowdale series, unless it could be